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Aframomum melegueta Improves Antioxidant Status of Type 2 Diabetes Rats Model

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Abstract : Aframomum melegueta K.Schum commonly known as Grains of Paradise has been a popularly used spice in most of the African food preparation. Available data have shown that ethyl acetate fraction from crude ethanolic extract exhibited α-amylase and α-glucosidase inhibitory actions, improved pancreatic β-cell damage and ameliorated insulin resistance in diabetic rats. Additionally, 6-gingerol, 6-shogaol, 6-paradol and oleanolic acid are shown to be the compounds responsible for the antidiabetic action of A. melegueta. However, detail antioxidant potential of this spice in a diabetic animal model has not yet been reported. Thus, the present study investigates the effect of oral consumption of A. melegueta fruit on the in vivo antioxidant status of type 2 diabetes (T2D) model of rats. T2D was induced in rats by feeding a 10% fructose solution ad libitum for two weeks followed by a single intraperitoneal injection of streptozotocin (40 mg/kg body weight (bw)). The animals were orally administered with 150 (DAML) or 300 mg/kg bw (DAMH) of the fraction once daily for four weeks. Data were analyzed by using a statistical software package (SPSS for Windows, version 22, IBM Corporation, NY, USA) using Tukey's-HSD multiple range post-hoc test. Values were considered significantly different at $p < 0.05$. According to the data, after four weeks of intervention, diabetic untreated animals showed significantly ($p < 0.05$) elevation of blood glucose levels. The levels of thiobarbituric acid reactive substances (TBARS) were observed to increase with concomitant reduction of reduced glutathione (GSH) levels in the serum and organs (liver, kidney, heart and pancreas) of diabetic untreated animals. The activities of endogenous antioxidant enzymes (superoxide dismutase, catalase, glutathione peroxidase, and reductase) were greatly reduced in the serum and organs of diabetic untreated animals compared to the normal animals. These alterations were reverted to near-normal after the treatment of A. melegueta fruit in the treated groups (DAML & DAMH) within the study period, especially at the dose of 300 mg/kg bw. This potent antioxidant action may partly be attributed to the presence of the 6-Gingerol, 6-shogaol and 6-paradol are known to possess antioxidant action. The results of our study showed that A. melegueta intake improved the antioxidant status of T2D rats and therefore could be used to ameliorate the diabetes-induced oxidative damage.

Keywords : Aframomum melegueta, antioxidant, ethyl acetate extract, type 2 diabetes
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